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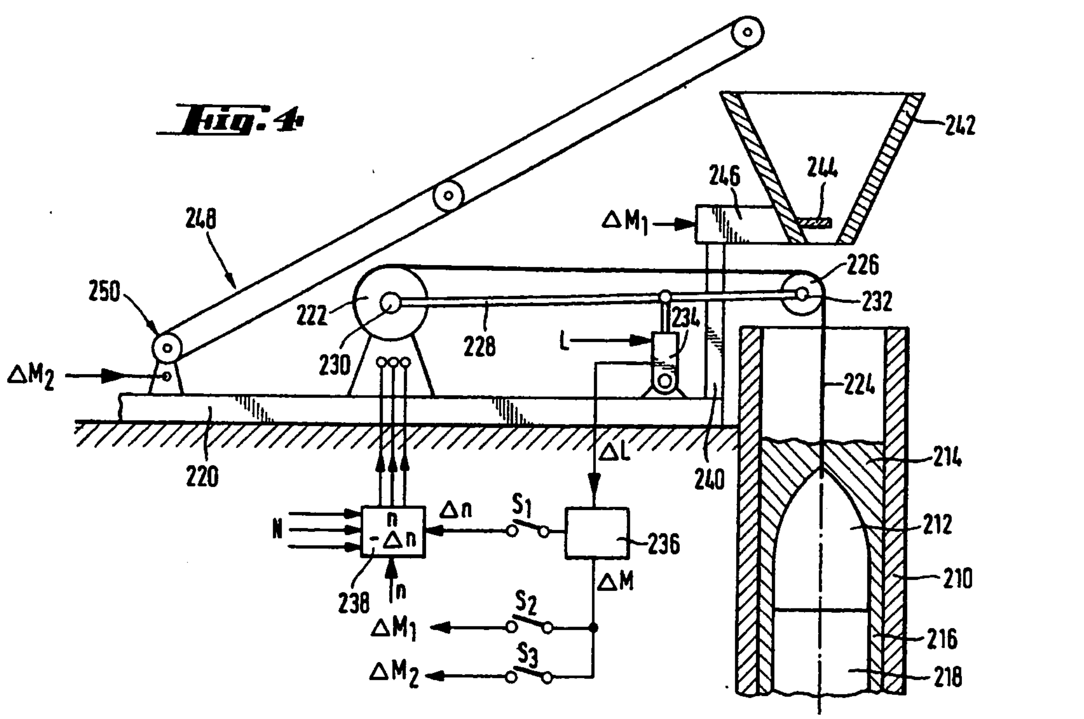
(54) **Method and apparatus for providing chimney flues with insulated coatings**

(57) The internal walls of a chimney flue require an insulating coating. For this purpose loose insulating composition (214) is introduced from above into the flue and compacted by means of a vibrating bell (212) which is raised in the chimney in a vibratory condition by means of a cable (224) connected to a motor-driven capstan (222). The belt acts to press the loose insulating composition located above it, outwards, so as to compact it against the internal walls of the flue to form a coating (216).

Fig. 4



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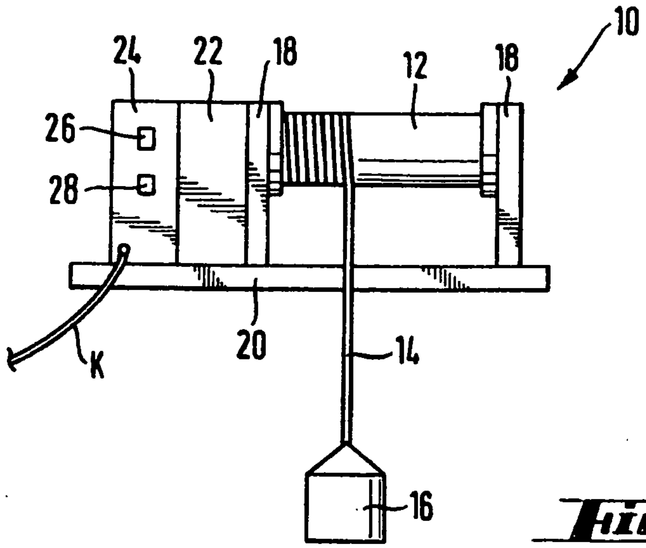
10
24
22
18
12
18
26
28
20
K
14
16

Fig. 1

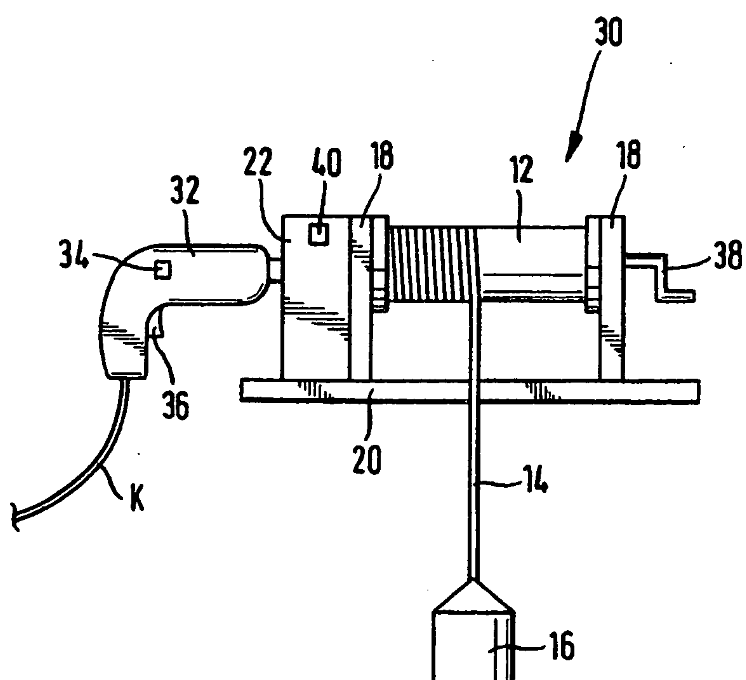
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Fig. 2

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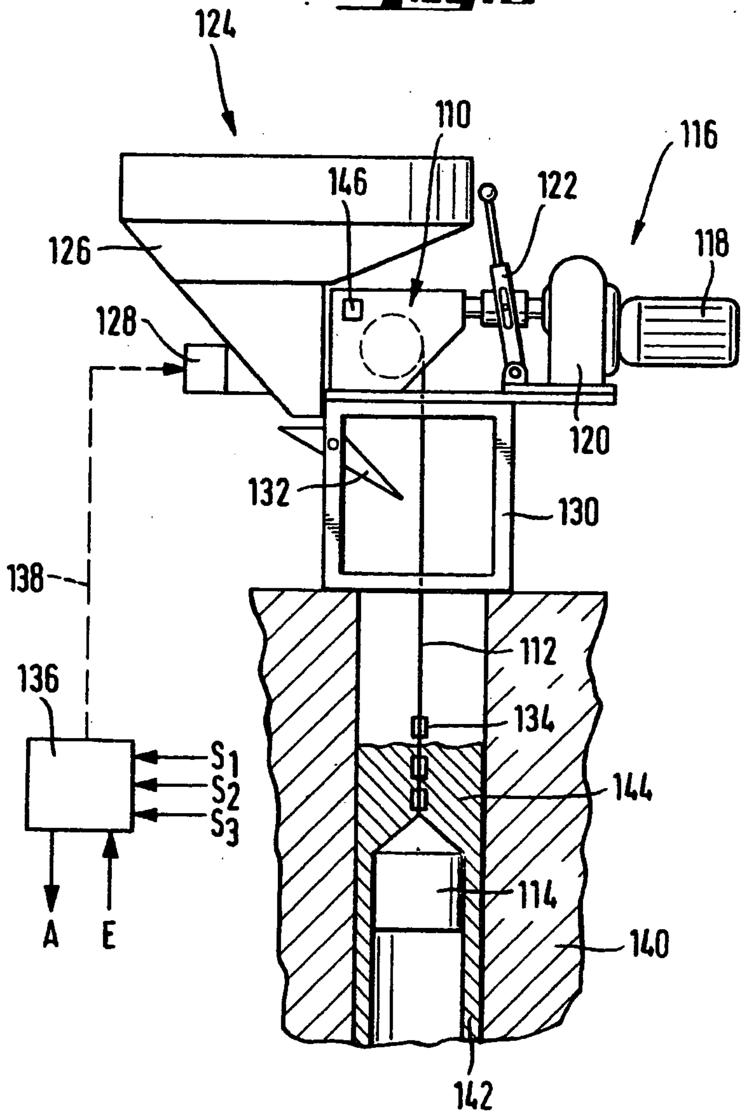
Fig. 3



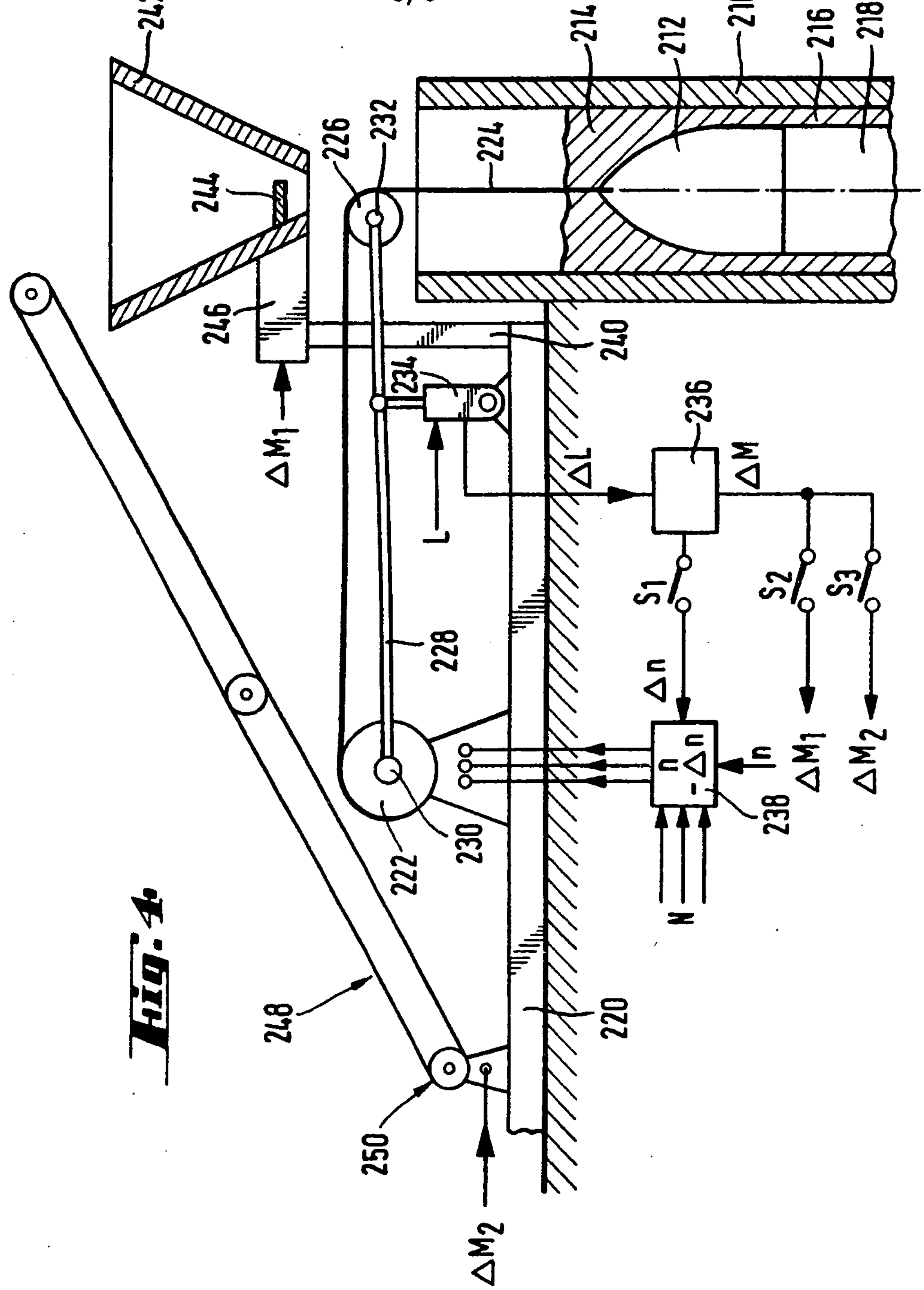

242
244
246
226
232
224
214
212
210
216
218
240
234
236
ΔM_1
L
ΔL
ΔM
S1
S2
S3
228
Δn
ΔM_1
ΔM_2
n
$-\Delta n$
In
238
222
230
N
248
220
250
ΔM_2

Fig. 4

SPECIFICATION

Meth d and apparatus f r pr viding chimney flues with insulated coatings

The invention relates to a method of providing chimney flues with insulating coatings, the internal walls of which chimneys are clad with an insulating composition introduced from above, by compaction with the aid of a vibrating bell which can be raised in the chimney flue in the vibrating condition by means of a cable which is connected to a capstan. As the bell is raised it presses the loose insulating composition located above it outwards so as to compact it against the walls of the chimney flue. The invention also relates to an apparatus used for carrying out this method with a cable capstan and a vibrating bell which can be connected to it by means of a cable.

The coating, in particular of relatively old chimney flues with insulating material, is becoming increasingly important. A chimney treatment of this type provides substantially reliable protection from soot and prevents walls which are adjacent to the chimney flue from becoming damp. During the coating process, a vibrating bell which is, for example, circular in cross-section is raised in a chimney flue which is, for example, square in cross-section by means of a cable and a hand operated cable capstan. In this process, loose coating material is introduced manually from the chimney outlet into the chimney flue. The coating material falls onto the vibrating bell and then passes gradually into the cavities between the vibrating bell and the chimney walls. The insulating composition is compacted and pressed against the chimney walls in these cavities owing to the vibrating movement of the vibrating bell. In the example given, a chimney flue which is primarily square in cross-section is thus shaped into a chimney flue with a circular cross-section. The processes of charging the material and actuating the cable capstan are performed manually, are very strenuous and labour-intensive and demand a large amount of care as well as experience of several operators. Moreover, it is very difficult to have a suitable reserve of the coating material available above the vibrating bell at all times as this region inside the chimney flue is not visible from outside and as differing quantities of charge material are consumed depending on the speed of movement of the vibrating bell as well as the exact size of the chimney flue with respect to the vibrating bell. The quantities consumed are also dependent on other factors such as the composition of the material. If the reserve above the vibrating bell is too small, the coating process is not satisfactory. If the reserve is too large, excessive forces are needed to lift the vibrating bell. Thus, with the conventional manual operation, it is necessary to maintain operating parameters which are as desirable as possible and which are dependent on the great skill and experi nce and constant attention of the operator. It has however been found that it is not usually possible t pr duce chimney coatings of sufficiently high and constant quality using the pr sent methods.

The object of the present invention is to provide a method and a suitable apparatus of the type mentioned in such a way that, with a substantial saving in operating personnel, the chimney flue coating process can be carried out in an extremely simple manner even by unskilled personnel while maintaining optimum operating conditions.

In order to solve the problem posed, it is proposed according to the invention that the vibrating bell be raised by the motor drive of the cable capstan in the chimney flue. This allows much simpler, more economic and substantially more uniform and more reliable coating of chimney flues. It has been found that coatings produced in this way have no irregularities and weak points as sources of defects in the entire course of the chimney flue. Unlike the former methods, a single operator merely has to fulfil a monitoring function.

With this method, it is also preferable for the depth of the insulating composition layer located above the vibrating bell which is to be controlled to an adjustable value or range in operation, or a value derived from it to be determined continuously or intermittently and utilised as controlled variable for the automatic control of the charging speed of an automatic insulating composition feed means and for the vibrating bell to be raised in the chimney flue by a motor drive means at a substantially constant adjustable speed. In this way, the coating process can be carried out virtually completely automatically and this leads to insulations of even better and more constant quality. The layer depth control can be carried out continuously or as a multi-point control. If the layer depth of the insulating composition falls below a minimum value, an intervention is made into the automatic operation in order to avoid defective coatings owing to too small a supply of insulating composition. For better monitoring of the course of operation and to avoid damage upon reaching the end of the chimney flue, the path covered by the vibrating bell at any time is determined in any suitable manner, for example mechanically, electrically, optically or magnetically by determining the rotations of the cable capstan. The charging process can be carried out continuously or discontinuously in such a way that the layer depth always remains substantially constant above the vibrating bell.

In another embodiment of the method according to the invention, it is preferable for the value of the locking cable tension exerted on the cable or a cable tension value derived from it to be determined continuously and utilised as controlled variable for the automatic control of the speed of a motor driven cable capstan and/or the charging speed of the insulating composition, in which process the capstan speed is reduced and/or the charging speed is increased as the cable tension decreases. This completely automatic method ensures that no defective chimney coatings are produced, even in extreme situations. This applies, for example, for the case of r latively small reserve quantities of insulating com-

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position above the vibrating bell as the capstan speed is then reduced automatically. Regardless of the respective course of the chimney flue which can exhibit bends, it is possible to use cable capstans and cables which are only exposed to limited tensile stresses and thus are relatively light and inexpensive. The control of substantially constant cable tension can be carried out continuously or discontinuously. Preferably, the cable capstan is stopped and/or a warning signal is emitted if a minimum cable tension value is fallen below and/or a maximum value exceeded. A minimum cable tension value can be fallen below for example if the cross-section of the chimney flue widens suddenly or if, for other reasons, the charge of material is inadequate. A maximum cable tension value can be exceeded, for example, of the vibrating bell jams in the chimney.

An apparatus which is used for carrying out the method according to the invention and which is provided with a cable capstan and a vibrating bell which can be connected to it by means of a cable possesses, according to the invention, a cable capstan which is formed with a drive motor. The drive motor is preferably an electric motor which drives the cable capstan preferably by means of a reduction gear. The drive motor can have a relatively small output of about 0.5 to 1 KW and it should be possible to change its direction of rotation and/or to control its speed. The drive motor can thus be used both for lowering and for raising the vibrating bell. The speed can be adapted to the respective operating conditions and can be reduced accordingly for gentle start-ups from a standstill as well as for coating particularly critical chimney regions. Furthermore, a cable capstan overload coupling and/or an electric drive motor overload switch preferably prevent damage due, for example, to jamming of the vibrating bell in the chimney flue. An additional cable capstan crank handle should also be provided so that the apparatus can operate even if there is no electric connection or if there is a power cut and so that an intervention can be made during the course of operation.

In conjunction with an apparatus in which the depth of the layer of insulating composition above the vibrating bell is controlled, it is also preferable for this apparatus to have an insulating composition charging device whose charging speed can be controlled, a measuring device for determining the depth of the insulating composition layer located above the vibrating bell, a control device which controls the charging device as a function of the measuring device, and a drive motor for the cable capstan. An apparatus of this type allows completely automatic operation and can be operated extremely easily. It is relatively simple and in xpensive and produces excellent results in terms of coating. A fe d hopper or pipe with a control member for changing the size of its outlet opening is preferably provided. In the case of a feed hopper, it is merely necessary to keep it filled substantially constantly. If a feed pipe is used, it can be connected, f r example, via a pressure or suction device to a relatively large supply of insulating composition which is located, for example, in a more remote container or a trailer r th like. In this case, no operators are needed for the actual charging process as an adequate supply of material is ensured at all times. The control member is influenced by the control device as a function of sensors arranged at various depths on the cable and/or on the vibrating bell which determine the depth of the insulating composition above the vibrating bell, for example in a mechanical, ohmic, capacitive, inductive or opto-electronic way. The control member can be, for example, a control flap coupled to a digitally controlled reversing lifting magnet or a worm fitted into a feed hopper. The charging speed of the insulating composition is determined in this case by the frequency or the length of opening pulses for the reversing lifting magnet or by the speed of the worm.

Another embodiment of an apparatus in which the cable tension is controlled preferably possesses a device which continuously determines the cable tension exerted on the cable during operation or a value derived from it and which emits cable tension deviation signals if the cable tension deviates from the standard condition. It also has a signal transducer which converts the cable tension deviation signals into those signals which are used for regulating the speed of the cable capstan relative to the standard speed and/or for regulating the charging speed of the charging material relative to a standard charging speed. This apparatus is also relatively simple, inexpensive and extremely advantageous. It can be operated very simply and allows virtually completely automatic operation even in critical circumstances, for example in chimney flues with bends and greatly varying cross-sections. With this apparatus, the respective cable tension can be determined by means of a deflecting roller for the cable by a resilient anti-vibration cable tension measuring member. This member can emit positive or negative cable tension deviation signals depending on the deviations in the cable tension and operates, for example, mechanically, electro-mechanically, pneumatically or hydraulically. The cable tension deviation signals are preferably converted in a signal transducer into speed and/or charge speed regulation signals. These signals are fed to a cable capstan speed control member, an adjusting member drive mechanism for an opening adjusting member of a feed hopper, a belt conveyor drive means for filling a feed hopper or the like. A substantially constant cable tension which is used as a gauge of standard operation is maintained by varying the charging speed and/or the cable capstan speed.

In another embodiment, the apparatus can have a controllable coupling which allows the vibrating bell to be lowered in the chimney flue independently of the drive motor under the influence of gravity. In addition, the coupling allows the drive connection to be severed quickly if a defect occurs. Moreover, the apparatus can be provided with a measuring devic which determines the respective position of th vibrating bell in the form of a counter of the number of rotations of the cable capstan, in order to hav a better view of th c urs of operation. In this case, a signal can be emitted if the resettable measuring

device attains an adjustable critical speed or rotation which is adjusted, for example, to the total length of the chimney flue or to the distance of movement until a critical chimney point is reached.

The method according to the invention and the apparatus according to the invention for carrying out the method allow considerable simplification of the operating procedures carried out manually in the past when providing chimney flues with insulating coatings. The procedures can be carried out by substantially uneducated personnel and with completely automatic operation require virtually only one operator who performs essentially a purely monitoring function and, possibly has to keep only one feed hopper full of insulating composition. The coating process itself can be carried out substantially uniformly and virtually completely free from defects without personnel.

In the accompanying drawings:

Figure 1 shows a schematic side view of an apparatus according to the invention with an electric drive motor mounted rigidly on a cable capstan.

Figure 2 shows a schematic side view of an apparatus according to the invention with a drive motor, flanged detachably to a cable capstan, in the form of an electric hand boring or screw-cutting machine.

Figure 3 shows a schematic side view of an apparatus according to the invention in which the depth of the insulating composition layer located above the vibrating bell is controlled.

Figure 4 shows a schematic view of an apparatus according to the invention in which the cable tension value is controlled.

The apparatus in Figure 1 has a cable capstan 10 with a rotatably mounted cable drum 12. A cable 14 is wound onto the drum to an extent which depends upon the operating condition and a vibrating bell 16 is suspended at the free end of the cable. In the vibrating condition, this is raised in a chimney flue (not shown) and simultaneously charged from above with loose insulating composition.

In Figure 1, both sides of the cable drum 12 in this case are mounted on stands 18 which are joined to a base member 20. On one side of the cable drum 12 there is a reduction gear 22 provided with an overload coupling (not shown) which is mechanically connected on the output side with the cable drum 12 and on the input side with the output of an electric drive motor 24. The drive motor 24 which can be connected electrically to the mains via a connecting cable K has a rotational direction switch 26 and a speed controller 28 so that the direction of rotation and the speed of rotation of the cable drum 12 can be adjusted.

According to Figure 1, the cable capstan 10 consisting of cable drum, reduction gear and drive motor is designed as a coherent unit. The embodiment in Figure 2 differs from it substantially in that the cable capstan illustrated therein is a coherent unit with the cable drum 12 as well as the reduction gear 22 and has a drive motor 32 which is separate from this unit in the form of a conventional commercial hand boring or screw-cutting machine. This machine can be connected via a connecting cable K to the electric mains and flanged to the input side of the reduction gear 22 with a few handles, for example, by connecting the clamping chuck (not shown) of the machine to an inlet shaft (also not shown) of the reduction gear 22 as a drive means. The drive motor 32 from Figure 2 also has a rotational direction switch 34 and a pistol take-off type speed controller 36.

Figure 2 shows only by way of example that the cable capstan 30 can have an additional crank handle 38 by means of which the cable drum 12 can be rotated manually if, for example, there is a power cut or if there is no drive motor 32 or no mains connection available. It is also pointed out that, for example, an indicator 40 for the position of the vibrating bell 16 or for the number of rotations of the cable drum 12 can be provided in the region of the reduction gear 22. These parts shown in Figure 2 can also be provided in the embodiment in Figure 1. The remaining parts from Figure 2 correspond to the parts in Figure 1 provided with the same reference numerals.

Since high tensile stresses have to be overcome and since, on the other hand, relatively small traction speeds are taken into consideration so as to ensure the best coating process, the cable capstan can be driven by a drive motor having a relatively low output. Traction speeds of, for example about 2 to 10 mm/sec have proven advantageous. In order to attain these values, the transmission ratio of the reduction gear has to be selected accordingly.

In the embodiment in Figure 3, a cable capstan 110 is driven by means of a fitted screw and wheel (not shown). The cable capstan 110 allows a cable 112, at whose free end is fixed a vibrating bell 114 to be wound and unwound. The apparatus also has an adjustable drive motor 116 with an electric motor 118 and the reduction gear 120, the outlet shaft of which (not described in detail) can be connected via a manually actuated coupling 122 to the cable capstan 110. A charging device 124, which has a feed hopper 126 in the present case, possesses an outlet opening (not described in detail) which can be altered in size by means of an electrically drivable control member 128. The control member 128 is for example a reversing lifting magnet which is coupled via a corresponding rod to a control flap (not shown) in the outlet opening of the feed hopper 126. The control member 128 and thus the control organ activated by it such as the said control flap can be controlled continuously or also discontinuously, for example by equally long opening pulses in the last-mentioned case with a pulse sequence adapted to the respective requirements.

The cable capstan 110 can be placed on a pedestal 130 with the suspending hopper 126 and the drive motor 116. In the present case, the pedestal is a cube-shaped scaffolding and possesses a pivotal shute 132 which guides the insulating composition from the outlet opening of the feed hopper 126 to about the central region of the pedestal 130. The pedestal can be placed on a chimney outlet and allows the chimney coating process to be carried out by the entry of the vibrating bell 114 into the interior of the pedestal 130 to the upper end of the chimney.

A measuring device 134 determines the depth of the layer of insulating composition above the vibrating bell 114 and possesses, for example, thre sensors which ar arranged at intervals in depth so as to be adjustably movable on the cable 112 and which emit one or more signals S1, S2, S3 as a function of the respective depth of the layer and can lead to a control device 136. This can take place by means of wires or also without wires. With the sensors, the height of the layer is determined, for example, by ohmic, capacitive, inductive or opto-electronic means. 2-point control of the depth of the layer is fundamentally possible. It has however proved advantageous to carry out 3-point or 4-point control. Several sensors which have differing functions are used for this purpose. Thus, for example, they can ensure that the electric motor 118 can only be switched on when the layer depth above the vibrating bell 114 is sufficient. In addition, they allow the depth of the layer to be controlled in several stages. They can also switch off the electric motor 118 when the depth of the layer becomes too small or when the upper sensor touches the cable capstan 110 for example. It is possible to provide one or more sensors with an electrically conducting lead which can be wound on or unwound from a lead drum running concurrently with the cable capstan 110 and which is held under initial spring tension with respect to the lead drum so that differences in the courses of movement are compensated.

One or more additional input signals E can be fed to the control device 136 in addition to the test signal or signals S1, S2, S3, these additional input signals containing for example instructions for switching on or switching off or information about the adjusted speed of the cable capstan 110 and thus about the lifting speed of the vibrating bell 114. The control device 36 produces, as a function of the layer depth determined at any time above the vibrating bell 114 as well as optionally of other input signals E, output signals which control the charging process and are fed via a signal connection 138 to the control member 128 of the charging device 124. The control device 136 can also produce additional output signals A, for example switching off instructions for the electric motor 118 as soon as the charging process is completed or as soon as the minimum depth of the layer above the vibrating bell 114 is not sufficient.

The apparatus shown in Figure 3 therefore allows a perfect insulating coating 142 of constant quality to be produced inside a chimney flue 140 by adjusting a substantially constant layer depth of the insulating composition 144 located above the vibrating bell 114 at an approximately constant lifting speed, more specifically by corresponding control of the insulating composition charging speed. In addition, the travel length can be determined by means of a rotational speed measuring devic 146 coupled to the cable capstan 110, which device determines the number of rotations f the cable capstan 110, for example by opto-electronic means. This measuring device 146 can be provided with a resettable display and/or can ensure reliable disconnection of th drive motor 116 as well as the charging device 124 upon completion of the coating process, thus be coupled to the electric motor 118 and/or the control device 136 and the control member 128. A liquid crystal display can be used to shown the travel length.

At the beginning of the coating process using the apparatus shown in Figure 3 it is necessary to let down the vibrating bell in the chimney flue as quickly as possible and then to actuate the control member of the charging device 124 until the desired depth of layer is attained. Only then does the automatic control take place in conjuction with the approximately constant lifting speed of the vibrating bell. To ensure permanent monitoring, it is possible to determine the current consumption of the electric motor 118 by means of an ammeter or the like. An increase in the current corresponds to an increase in the resistance of the vibrating bell inside the chimney flue and can be brought into play for protection from overload in that the entire apparatus is turned off after a certain time if a certain current limit is exceeded. This should prevent the apparatus and/or the chimney flue from being damaged, for example if the vibrating bell 114 jams.

According to Figure 4, a vibrating bell 212 is raised in a chimney flue surrounded by a chimney wall 210 above which is located loose charge material 214 introduced from above, which is pressed laterally outwards toward the chimney wall 210 and is compacted there as the vibrating bell 212 is raised. This process leads to a solid coating 216. As the vibrating bell 212 continues to rise, a sufficient quantity of coating material 214 has to be introduced into the chimney flue. A chimney cavity 218 which is, for example, circular in cross-section then remains downstream of or in the present case below the vibrating bell 212 and is limited directly by the insulating coating 216.

The apparatus has a base frame 220 on which is fixed a motor driven cable capstan 222. A cable 224 leads from it to the front central region of the vibrating bell 212 in order to act as a drive means for it. In the present case, the cable capstan 222 is located next to the chimney flue and the cable 224 runs over a deflecting roller 226 above the chimney outlet. A pivoting support 228 is pivotally fixed on the one hand to a bearing 230 of the cable capstan 222 and connected on the other hand to a bearing 232 of the deflecting roller 226. The deflecting roller is thus pivotal to a limited extent about the bearing 230 and thus about a horizontal axle.

Between the ends of the pivoting support 228, a cable tension measuring member 234 is pivotally hinged to it and is pivotally hinged at its other end to the base plate 220. The cable tension measuring member is preferably a resilient anti-vibration pivoting support holder which can be supplied with an adjustable basic length L from the exterior. The basic length L is selected in such a way that the deflecting roller 226 or th pivoting support 228 adopts a suitable normal or rest position, as exemplified in th drawing in the normal operating condition, thus taking into consideration a corresponding reserve of charge material 214 above the vibrating bell 212, also the vibrating movement of the vibrating bell 212 and its speed of advance travel. This n rmal position can be set, for example, by adjusting a spring inside

the cable tension measuring member 234.

The cable tension measuring memb r 234 is such that in the case of a positive or negative change in length thereof owing to a change in the cable tension or a change in the position of the pivoting support 228 a preferably electric, more specifically positive or negative, signal tension deviation signal is produced in the form of a cable tension-dependent positive or negative length change signal ΔL. This signal enters a signal transducer 236 which produces a speed change signal Δn and/or a charge for quantity change signal ΔM from it. The speed change signal Δn can be passed by closing a switch S_1 to a cable capstan speed control member 238 which is fed with a normal speed n. The speed control member 238 ensures that the cable capstan 222 supplied from the mains N is operated at a speed corresponding to the difference n-Δn, wherein Δn corresponds to a positive value of ΔL with a positive amount and thus a release of the cable tension. When this occurs, the cable capstan 222 is reduced in terms of speed.

A holder 240 which is connected to the base frame 220 ensures that a feed hopper 242 is held above the chimney outlet and, in the present case, above the deflecting roller 226. The feed hopper 242 serves to supply the feed material, in which process it is preferably possible to open its hopper opening to a greater or lesser extent by means of an opening adjusting member 244 which is actuated by a preferably electrically operating adjusting member drive mechanism 246.

By closing a switch S_2 it is possible to guide the output-side charge change single ΔM of the signal transducer 236 as a signal ΔM_1 to the adjusting member drive mechanism 246 in order to constrict the hopper opening in the case of an increase in the cable tension and to increase the hopper opening in the case of a reduction in the cable tension. By closing the switch S_3 the signal ΔM can be fed as signal ΔM_2 to a belt conveyor drive mechanism 250 of a belt conveyor 248 so as to control the speed, in which process the belt conveyor 248 serves to introduce the charge material into the feed hopper 242. The charging speed can thus be controlled, for example, by a belt conveyor 248 in the sense of maintaining a substantially constant cable tension instead of by using the opening adjusting member 244 of the feed hopper 242 or in addition to it. As the cable tension diminishes, the operating speed of the belt conveyor 248 is increased whereas it is reduced as the cable tension increases.

The processes for controlling the speed of the cable capstan 222 as well as the charge speed by influencing the hopper opening and/or by changing the belt conveyor speed can be carried out individually or in conjuction with each other. In the simplest case, only the speed of the cable capstan 222 or the charging speed in controlled at any time.

The apparatus in Figure 4 can be modified in many ways. This applies in particular to the determination of the cable tension and the type as well as the processing of the cable tension-dependent signals. The physical arrangement as well as the connection of the individual parts of the apparatus is not critical and can be adapted to the respective operating requirements. Basically, it is not absolutely essential, as in the present case, to use a pivoting support 228, which is additionally hinged to th cable capstan 222. The latter could instead be physically or spatially separated from the deflecting roller 226 as well as a supporting device related to it and could be placed at a point remote from the chimney outlet. It is also possible to determine the changes in cable tension mechanically, electrically or in a similar manner directly at the cable capstan 222. If a belt conveyor 248 is used which can also be supported at a point which is spatially remote from the chimney output, it is not absolutely essential to use an additional feed hopper 242. Moreover, a belt conveyor 248 can be dispensed with if a feed hopper 242 is used.

CLAIMS

1. A method for providing internal walls of a chimney flue with an insulating coating, wherein loose insulating composition is introduced from above into the said flue, and compacted by means of a vibrating bell which is raised in the chimney flue in a vibratory condition by means of a cable connected to a motor-driven capstan, the bell acting to press the loose insulating composition located above it outwards so as th compact it against the internal walls of the said flue.

2. A method according to claim 1, wherein the capstan is driven by an electric motor.

3. A method according to claim 1 or 2, wherein the vibrating bell is raised at a speed of from 2 to 10mm/sec.

4. A method according to any preceding claim, wherein the insulating composition located above the vibrating bell is in the form of a layer whose depth is regulated in operation.

5. A method according to claim 4, wherein the said depth is determined continuously or intermittently and is used as a control variable for the automatic control of the charging speed of an automatic insulating composition supply means, the vibrating bell being raised in the chimney flue at a substantially constant, adjustable speed.

6. A method according to claim 4 or 5, wherein continuous control of the layer depth is carried out.

7. A method according to claim 4 or 5, wherein multipoint control of the layer depth is carried out.

8. A method according to any one of claims 4 to 7, wherein the capstan is stopped and/or a warning signal is emitted if the depth of the insulating composition layer falls below a minimum value during operation.

9. A method according to any one of claims 4 to 8, wherein the path covered during each ascent of the vibrating bell is determined directly or indirectly, and the capstan is stopped and the charge is interrupted and/or a warning signal is emitted as soon as the path covered attains an adjustable limit value.

10. A method according to claim 5 or any one of claims 6 to 9 as dependent on claim 5, wherein the charging process is carried out substantially continuously.

11. A method according to claim 5 or any one of claims 6 to 9 as dependent on claim 5, wherein the charging process is carried out discontinuously.

12. A method according to any preceding claim, wherein the tension exerted on the cable is determined continuously and the said tension or a value derived therefrom is used as a control variable for the automatic control of the speed of a motor driven capstan and/or the charging speed of the insulating composition, in which process the capstan speed is reduced and/or the charging speed in increased as the cable tension diminishes.

13. A method according to claim 12, wherein the control which is dependent on the cable tension is carried out continuously and a substantially constant cable tension is maintained.

14. A method according to claim 12, wherein the control which is dependent on the cable tension is carries out discontinuously.

15. A method according to any one of claims 12 to 14, wherein the capstan is stopped and/or a warning signal is emitted if the cable tension falls below a minimum cable tension value or exceeds a maximum cable tension value.

16. A method for providing internal walls of a chimney flue with an insulating coating, substantially as herein described with reference to any one of the embodiments shown in the accompanying drawings.

17. An apparatus for providing internal walls of a chimney flue with an insulating coating, comprising charging means for introducing loose insulating composition from above into the said flue, a vibrating bell arranged to be raised in the said flue in a vibratory condition, a capstan, a motor for driving the capstan and a cable connected to the said capstan and to the said bell whereby the said raising of the bell is effected, the bell being operable to press the loose insulating composition above it outwards so as to compact it against the said internal walls of the flue.

18. An apparatus according to claim 17, wherein said motor is an electric motor.

19. An apparatus according to claim 17 or 18, comprising a reduction gear between the motor and the capstan.

20. An apparatus according to any one of claims 17 to 19, wherein the motor has an output of from 0.5 to 1 KW.

21. An apparatus according to any one of claims 17 to 20, wherein the rotational direction of the motor is variable and/or its speed controllable.

22. An apparatus according to any one of claims 17 to 21, comprising an overload coupling for the capstan and/or an overload switch for the motor.

23. An apparatus according to any one of claims 17 to 22, wherein the capstan is provided with a crank handle.

24. An apparatus according to any one of claims 17 to 23, comprising a measuring device for determining the depth of the layer of insulating composition located above the vibrating bell and a control device adapted to contr l the charging m ans as a function of the measuring device.

25. An apparatus according to claim 24, wherein the charging means has a feed hopp r or tube having an outlet opening and a control member for changing the size of the said outlet opening.

26. An apparatus according to claim 23 or 24, wherein the measuring device has a plurality of sensors which are adjustably fixed at int rvals on the cable and/or on the vibrating bell and are coupled to the said control device for determining the depth of the layer of insulating composition.

27. An apparatus according to any one of claims 24 to 26, wherein the control device is arranged to produce opening pulses of constant length as a function of the depth of the insulating composition, with a variable pulse spacing, the control member being connected to receive the said pulses.

28. An apparatus according to claim 27, wherein the control device is a control flap arranged to open or close an outlet of the charging means.

29. An apparatus according to claim 24, wherein the control device is adapted to produce drive signals as a function of the insulating composition depth, and the said charging means comprises a feed hopper having therein a control member in the form of a worm, the worm being controlled in dependence of the said drive signals.

30. An apparatus according to any one of claims 17 to 24, comprising a transducer adapted to continuously determine the cable tension exerted on the cable in operation or a value deribed from it and adapted to emit cable tension deviation signals if the cable tension deviates from a standard condition, the cable tension deviation signals being operable to regulate the speed of the capstan relative to a standard speed and/or to regulate the charging speed of the insulating composition relative to a standard charging speed.

31. An apparatus according to claim 30, wherein a deflecting roller for the cable is mounted on a resilient, anti-vibration cable tension measuring member which emits positive or negative cable tension deviation signals which are dependent on the direction of the deviation when the cable tension deviates from the standard condition.

32. An apparatus according to claim 31, wherein the deflecting roller is mounted on a pivotal support for pivotal movement about a stationary horizontal axis, the pivotal support being arranged above the cable tension measuring member in an adjustable normal position.

33. An apparatus according to claim 32, wherein the pivotal support is mounted on a bearing of the capstan.

34. An apparatus according to claim 33 wherein the cable tension measuring member is hingedly mounted as a pressure member between the pivotal support and a base frame.

35. An apparatus according to any one of claims 30 to 34, wherein the said transducer is arranged to convert the cable tension deviation signals into speed and/or charge speed regulation signals.

36. An apparatus according to claim 35, wherein the said transducer is connectible to a capstan speed control member.

37. An apparatus according to claim 35 or 36, wherein the said transducer is connectible to an adjusting member drive mechanism for an opening adjusting member of a feed hopper.

38. An apparatus according to any one of claims

34 to 37, wherein the said transducer is connectible in speed-controlling manner to a belt conveyor drive mechanism of a belt conveyor in ord r to fill a feed hopper.

39. An apparatus according to any one of claims 17 to 38, comprising a controllable coupling between the drive motor and the capstan.

40. An apparatus according to any one of claims 17 to 39, wherein the capstan is provided with a measuring device which determines the respective position of the vibrating bell and is in the form of a counter arranged to count the number of rotations of the capstan.

41. An apparatus according to claim 40, wherein the measuring device is resettable and is adapted to emit a signal at an adjustable critical rotational speed.

42. An apparatus according to any one of claims 17 to 41, which is in the form of a single unit adapted to be placed on a chimney flue, the unit comprising a feed hopper for insulating composition, the capstan and the drive motor.

43. An apparatus according to claim 42, wherein the feed hopper has an outlet which is adjustable in size by an electrically actuated control member.

44. An apparatus according to claim 42 or 43, wherein the said unit has a pedestal located beneath the capstan.

45. An apparatus according to any one of claims 42 to 44, wherein the feed hopper and the drive motor are arranged on opposite sides of the capstan so as to balance the weight.

46. An apparatus according to claim 45, wherein the pedestal has a pivotal insulating composition chute leading from the outlet opening of the feed hopper approximately to its central region.

47. An apparatus for providing internal walls of a chimney flue with an insulating coating, substantially as herein described with reference to any one of the embodiments shown in the accompanying drawings.

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